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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/535,652	01/30/2006	Mark G. Mortenson	BKL: 114 (c) US	7037

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EXAMINER

DIAMOND, ALAN D

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/535,652	Applicant(s) MORTENSON, MARK G.	
	Examiner Alan Diamond	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 May 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20060316</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Reference signs f_1 , f_2 , f_0 , and a_{\max} are missing from Figure 4 (see page 11, lines 31-33 of the specification); and reference signs λ , "a" and ν are missing from Figure 2 (see page 13, lines 21-22 of the specification). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: In Figure 7, there are reference signs "1" and "8011" toward the center of the figure. These reference signs have not been mentioned in the description. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the

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application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "1" has been used to designate both a sine wave in Figure 2 and a part of the apparatus in Figure 7. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: On page 18, at line 15, the term "source 11" should be changed to "cable 11" so as to agree with the term "cable 11" at page 18, line 12. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2, 8, 9, 11-13, 15, and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 2, at line 1, the word "said" should be inserted after "wherein" so as to clearly refer back to the at least one means for modifying sunlight that is recited in parent claim 1.

At line 1 in claims 8 and 9, in claim 11 at line 4, and in claim 16 at line 1 and bridging lines 1 and 2, the term "substantially all" is indefinite because it is subjective. It is suggested that "substantially" be deleted from said term.

At line 2 in each of claims 11, 12, and 13, the term "substantially symmetrically" is indefinite because it is subjective. It is suggested that "substantially" be deleted from said term.

Claim 15 is indefinite because it is not clear how the recited method can be for determining desirable energies to be incident on a solar cell substrate material when there is not recitation in the claim as to what is considered desirable. Claim 33 recites three determining steps, but is not clear how the results of these determining steps determine desirable energies. The same applies to dependent claim 16.

Claim Rejections - 35 USC § 102/103

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7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Samulon et al, U.S. Patent 3,076,861.

With respect to claims 1 and 14, Samulon et al teaches a solar cell having an integral filter element (22), i.e., instant at least one means for modifying sunlight, that transmits only those wavelengths of incident solar radiation which are useful for conversion by the solar cell into electrical power (see col. 1, lines 13-72; and Figure 2). The other wavelengths of solar radiation, which are ordinarily dissipated in the form of heat in the solar cell without producing any useful electrical power, are reflected from the cell (see col. 2, lines 56-70). Figure 3 of Samulon et al shows that the filter element limits reception by the solar cell to that band of wavelengths for which the solar cell has maximum response (see col. 3, lines 48-69). Thus, it is the Examiner's position that said filter (22) minimizes the amount of destructively interfering wavelengths incident on the silicon wafer (12). It is also the Examiner's position that light that is passed through

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to Samulon et al's solar cell inherently includes the instant harmonics and heterodynes. By using the filter, Samulon has made a determination as to the desirable and undesirable energies that can be applied to the solar cell. The substrate (14,16) of Samulon et al's solar cell is silicon wafer, i.e., crystalline silicon (see col. 1, lines 13-28; and col. 2, lines 31-42). Samulon et al's Figure 3 shows what is well known in the art, i.e., that silicon has a primary band gap corresponding to a primary wavelength of 1.1 microns.

With respect to claims 3 and 4, Samulon et al's filter element (22), which covers a surface of the solar cell, corresponds to the instant means for modifying sunlight (see Figure 2 and 3; and col. 2, lines 55-70).

With respect to claim 5, semiconductor substrate (12) for Samulon et al's solar cell is made from silicon wafer, i.e., crystalline silicon (see col. 1, lines 13-28; and col. 2, lines 31-42).

With respect to claim 6, the integral filter element (22), i.e., instant at least one means for modifying sunlight, transmits only those wavelengths of incident solar radiation which are useful for conversion by the solar cell into electrical power (see col. 1, lines 13-72; and Figure 2). The other wavelengths of solar radiation, which are ordinarily dissipated in the form of heat in the solar cell without producing any useful electrical power, are reflected from the cell. Figure 3 of Samulon et al shows that the filter element limits reception by the solar cell to that band of wavelengths for which the solar cell has maximum response (see col. 3, lines 48-69). Thus, it is the Examiner's position that said filter (22) minimizes the amount of destructively interfering

wavelengths incident on the silicon wafer (12), e.g., it reduces the amount of sunlight which does not correspond to the harmonics and heterodynes.

With respect to claims 7-9, it is the Examiner's position that all harmonics and all heterodynes pass through said filter (22).

With respect to claims 10-13, the filter transmission is symmetric (as seen in Figure 3), and corresponds to the instant plurality frequencies of light, plurality of harmonics, and plurality of heterodynes.

Since Samulon teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the presently claimed requirement of reducing negative interactions within the solar cell photovoltaic substrate material relative to unfiltered light, and the instant harmonics and heterodynes would obviously have been present once Samulon et al's solar cell has been provided and used. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

10. Claims 1-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Strebkov et al, U.S. Patent 4,151,005.

Strebkov et al teaches a photovoltaic generator whose surface is covered with a protection layer which receives direct incident radiation and passes the photoactive part of the spectrum thereof to the operating surface of the photovoltaic generator (see abstract; and col. 8, lines 29-52). The protection layer protects the photovoltaic

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generator from radiation effects which are liable to damage the semiconductor and lower the performance of the photovoltaic generator (see abstract; and col. 8, lines 29-52). Thus, it is the Examiner's position that negative interactions in the semiconductor of the photovoltaic generator having the protection layer will be reduced relative to the semiconductor of a photovoltaic generator that does not have the protection layer. It is also the Examiner's position that light that is passed through to Strebkov et al's photovoltaic generator inherently includes the instant harmonics and heterodynes. By using said protection layer, Strebkov et al has made a determination as to the desirable and undesirable energies that can be applied to the solar cell, as per instant claim 14. The substrate (6) of Strebkov et al's photovoltaic generator is silicon wafer, i.e., crystalline silicon (see col. 7, lines 19-28; and col. 21, lines 17-36). Since Strebkov et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the presently claimed requirement of reducing negative interactions within the solar cell photovoltaic substrate material relative to unfiltered light, and the instant harmonics and heterodynes would obviously have been present once Strebkov et al's photovoltaic generator has been provided and used. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

11. Claims 1-4 and 6-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hashimoto, U.S. Patent 4,963,196.

Hashimoto teaches an organic solar cell comprising an organic photoconductive layer comprising a charge generating substance and a charge transporting substance, and a protective layer covering the organic photoconductive layer blocking low wavelength light of below 450 nm (see abstract; and col. 1, lines 48-65). Because of the presence of the protective layer, a change in photo-current due to photo-degradation of the charge transporting substance is suppressed while maintaining a high photo-electric conversion efficiency (see abstract; and col. 1, lines 48-65). Thus, it is the Examiner's position that negative interactions in the charge transporting substance of an organic solar cell having the protection layer will be reduced relative to the charge transporting substance of an organic solar cell that does not have the protection layer. It is also the Examiner's position that light that is passed through to Hashimoto's solar cell inherently includes the instant harmonics and heterodynes. By using said protective layer, Hashimoto has made a determination as to the desirable and undesirable energies that can be applied to the solar cell, as per instant claim 14. The substrate (2,3) of Hashimoto's organic solar cell is organic semiconductor (see Figure 1; and col. 3, line 50 through col. 4, line 59). Since Hashimoto teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the presently claimed requirement of reducing negative interactions within the solar cell photovoltaic substrate material relative to unfiltered light, and the instant harmonics and heterodynes would obviously have been present once Hashimoto's organic solar cell has been provided and used. Note In re Best, 195

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USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

12. Claims 1-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Aguilera et al, U.S. Patent 6,107,564.

Aguilera et al teaches a cover for a solar cell, wherein the cover comprises a bandpass filter and usually also has an ultraviolet reflecting coating and a heat reflecting coating (see abstract; and col. 1, lines 4-20). The filter is designed to pass almost all of the solar radiation within the band of optical wavelengths to which the cell is sensitive, and reflects near infrared radiation that lies immediately adjacent the sensitivity band of the solar cell. Thus, it is the Examiner's position that negative interactions in the semiconductor of a solar cell having the cover will be reduced relative to the semiconductor of a solar cell receiving unfiltered sunlight. It is also the Examiner's position that light that is passed through to Aguilera et al's solar cell inherently includes the instant harmonics and heterodynes. By using said cover, Aguilera et al has made a determination as to the desirable and undesirable energies that can be applied to the solar cell, as per instant claim 14. Aguilera et al's solar cell is a silicon solar cell (i.e., a crystalline silicon solar cell) (see col. 7, lines 20-29). Since Aguilera et al teaches the limitations of the instant claims, the reference is deemed to be anticipatory.

In addition, the presently claimed requirement of reducing negative interactions within the solar cell photovoltaic substrate material relative to unfiltered light, and the instant harmonics and heterodynes would obviously have been present once Aguilera et

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al's solar cell with cover has been provided and used. Note In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 103 in addition to the rejection made above under 35 USC 102.

Claim Rejections - 35 USC § 103

13. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Samulon et al (U.S. Patent 3,076,861).

Samulon et al teaches a solar cell having an integral filter element (22), i.e., instant at least one means for modifying sunlight, that transmits only those wavelengths of incident solar radiation which are useful for conversion by the solar cell into electrical power (see col. 1, lines 13-72; and Figure 2). The other wavelengths of solar radiation, which are ordinarily dissipated in the form of heat in the solar cell without producing any useful electrical power, are reflected from the cell (see col. 2, lines 56-70). Figure 3 of Samulon et al shows that the filter element limits reception by the solar cell to that band of wavelengths for which the solar cell has maximum response (see col. 3, lines 48-69). Note from the "solar cell response" curve in Samulon's Figure 3 that the primary wavelength for the solar cell is at about 0.85 microns. It is the Examiner's position that said filter (22) minimizes the amount of destructively interfering wavelengths incident on the silicon wafer (12). It is also the Examiner's position that light that is passed through to Samulon et al's solar cell inherently includes the instant harmonics and heterodynes. Indeed, a harmonic of 0.85 microns is 0.425 microns, and seen in said Figure 3, the filter permits some transmission of 0.425 microns. By using the filter, Samulon has made a determination as to the desirable and undesirable energies that can be applied

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to the solar cell. The substrate (14,16) of Samulon et al's solar cell is silicon wafer, i.e., crystalline silicon (see col. 1, lines 13-28; and col. 2, lines 31-42).

Samulon et al teaches the limitations of the instant claims other than the difference which is discussed below.

Samulon et al does not specifically teach a step for determining at least one harmonic and at least one heterodyne. However, the determination of the harmonics and heterodynes for any of the wavelengths in Samulon et al's Figure 3 is a mental thought process, which is not deemed to distinguish the instant device or methods from what is disclosed in Samulon. Samulon et al's Figure 3 already has a primary wavelength, harmonics and heterodynes, and thus, determination of what is already in the prior art does not distinguish over the prior art. For example, a harmonic of the 0.85 micron primary wavelength is 0.425 microns, which is already present in the wavelengths that Samulon et al's filter permits to reach the silicon wafer. Thus, in the absence of anything unexpected, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined heterodynes and harmonics for the wavelengths in Samulon et al's Figure 3, in particular, for the primary wavelength of 0.85 microns, because the determination of known features that can be calculated by mental thought process and that are already present in the prior art, i.e., harmonics and heterodynes in said Figure 3, would have been within the level of ordinary skill in the art.

Double Patenting

14. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the

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unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

15. Claims 1-16 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 17-35 of copending Application No. 10/478,189. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of said copending application, while not of the same scope as the instant claims, anticipate the instant claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patents 5,625,485 and 5,689,335, WO 02/093657 and WO 2004/047153 are hereby made of record. Also made of record is Khurgin et al,

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"Heterodyning far-infrared light using coherent photovoltaic effect," Summaries of papers presented at the Conference on Lasers and Electro-Optics, CLEO 98, pages 473-474, May 3-8, 1998.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
June 5, 2006

A handwritten signature in black ink, appearing to read 'Alan Diamond', with a stylized flourish at the end.